

## REMARKS

The amendments set out above and the following remarks are believed responsive to the points raised by the Office Action dated February 22, 2001. In view of the amendments set out above and the following remarks, reconsideration is respectfully requested.

### The Pending Claims

As a convenience for the Examiner, a complete set of the pending claims is attached to this response as an Appendix.

Since claims 10-12 have been canceled, claims 1-9 and 13-42 remain pending. Claims 66 and 67 are added by this amendment.

Several changes have been made in the specification to improve its form. Support for the paragraph amended in the specification beginning on page 11, line 4, may be found, for example, in originally filed claims 4 and 5. These changes do not constitute the addition of new matter.

Claims 1-9 and 13-42 have been amended to remove reference numerals in the claims. New claims 66-67 are supported in the specification at, for example, page 18, lines 5-8. No new matter has been added.

### The Office Action

The Office Action set forth the following grounds for rejection: (1) claims 10-12 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention; (2) claims 6 and 10-12 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention; (3) claims 1-34 are rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,361,483 ("Pall '483") in view of U.S. Patent No. 5,846,421 ("Ohtani") or U.S. Patent No. 4,926,354 ("Meyering et al.") or U.S. Patent No. 4,154,688 ("Pall '688"); and (4) claims 35-42 are rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Pall '483 in view of Ohtani or Meyering et al. or Pall '688 and further in view of U.S. Patent No. 1,264,718 ("Wagner").

### Discussion of 35 U.S.C. § 112, Paragraph One Rejection

Claims 10-12 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one

skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The rejection is respectfully traversed.

The Applicants submit that claims 10-12 are described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. In particular, claim 10 is supported, for example, on page 12, line 16. Claim 11 is supported, for example, on page 12, lines 22-24. Claim 12 is supported, for example, on page 12, lines 20-22. However, this rejection is now moot since these claims have been cancelled to conform the claims to the elected invention in response to the restriction requirement. The Applicants reserve the right to include these claims in one or more divisional applications.

Further, the Examiner objected to the specification for not adequately disclosing the compositions corresponding to the trademarks "FLUORODYNE" and "SUPOR." The Applicants are perplexed as to this rejection with respect to claims 10-12 because these claims do not refer to FLUORODYNE or SUPOR. However, the Applicants submit that the specification identifies these as suitable filter media available from Pall Corporation as set forth at specification page 10, lines 16-18. Further, the Applicants submit that the meanings of FLUORODYNE and SUPOR are well-known in this country to those of ordinary skill in the art and are satisfactorily defined in the literature, for example, the literature available from Pall Corporation. (See MPEP § 608.01(v)). Both FLUORODYNE and SUPOR are registered Trademarks by Pall Corporation or Pall Corporation's subsidiary Gelman Sciences, Inc.

Thus, it is respectfully submitted that with these amendments to the claims, the basis for rejection under 35 U.S.C. § 112, first paragraph has now been overcome and should be withdrawn.

#### Discussion of 35 U.S.C. § 112, Paragraph Two Rejection

Claims 6 and 10-12 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Applicants disagree with the Examiner. However, with respect to claims 10-12, the Applicants are canceling these claims via Amendment in order to conform the claims to the elected invention subject to the restriction requirement. The Applicants reserve the right to submit these claims in one or more divisional applications. With respect to claim 6, the Applicants submit that the compositions of the FLUORODYNE filter medium and the SUPOR filter medium correspond to the compositions of the water-wettable filter medium available from Pall Corporation under these trade designations.

Discussion of Obviousness Rejection over Pall '483 in view of Ohtani or Meyering et al. or Pall '688

Claims 1-34 are rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Pall '483 in view of Ohtani or Meyering et al. or Pall '688. This rejection is respectfully traversed.

Claim 1 defines a filter assembly comprising a plastic housing that can be sterilized by subjecting the interior of the housing to steam under pressure while the exterior of the housing is at atmospheric pressure without damaging the housing and a filter element held in the housing comprising a filter medium of water wettable material wherein the first end of the filter medium is embedded in a first end cap of a plastics material and the second end of the filter medium is embedded in a second end cap of a plastics material forming respective water-wettable joints with the filter medium. The present invention addresses a combination of related problems in the art and provides a solution to those problems. For example, the present invention obviates the problems associated with embedding a filter medium directly within a plastic housing, wherein the housing material must be chosen to provide a suitable join with the filter medium. Such a plastic material will likely not also withstand in situ steam sterilization. (See specification page 4, lines 8-23). The present invention provides a filter medium embedded in an end cap comprised of a material specifically chosen for compatibility with the filter medium in ways that a plastic (suitable for in situ sterilization) cannot offer. Thus, the present invention addresses the problems associated with making a water-wettable connection between a water-wettable filter medium and an end cap while also addressing problems associated with in situ steam sterilization. (See specification page 2, line 20 through page 3, line 5 and page 4, lines 8-23).

Upon reading the references cited by the Examiner, one of ordinary skill in the art would find no motivation to select a housing that withstands subjecting the interior of the housing to steam under pressure while the exterior of the housing is at atmospheric pressure without damaging the housing and a filter element held in the housing comprising a filter medium of water wettable material wherein the first end of the filter medium is embedded in a first end cap of a plastics material and the second end of the filter medium is embedded in a second end cap of a plastics material forming respective water-wettable joints with the filter medium. The related problems solved by the present application are not addressed, let alone solved, by any of the cited references, or their combination. These references address very different problems in the art.

For example, the principle reference cited by the Examiner, Pall '483, is directed to making a disposable unitary filter assembly for filtering pharmaceutical materials without danger of contaminating downstream effluent in the event of leakage of unfiltered fluid material past a filter seal. (See column 3, lines 3-7). This reference does not address the current problem

addressed in the present invention. For example, Pall '483 discloses combinations that would not work together to satisfy the elements of claim 1, i.e., Pall '483 discloses many combinations of materials that cannot be steam sterilized without compromising either the water wettability of the joints between the filter medium and the end caps or the ability of the housing to withstand steam sterilization

None of the other references either address the combination of problems solved by the present invention or make up the deficiencies in Pall '483, the primary reference cited by the Examiner. With respect to Ohtani, Ohtani provides a microfiltration membrane cartridge filter formed by liquid tightly sealing joints of a rounded filter sheet and liquid-tightly sealing opposite ends of the sheet by end plates, wherein pores in the opposite end portions of the cylindrical pleated membrane are filled with high molecular weight polymers. (See column 2, line 60 through column 3, line 2). Ohtani also discloses many combinations of materials that cannot be steam sterilized without compromising the water wettability of the joints between the filter medium and the end caps. With respect to Meyering, Meyering focuses on providing a fluid tight seal between a filter element and a sealing surface of a filter housing. (See column 7, lines 24-26). Meyering discloses many combinations of materials that cannot be steam sterilized. With respect to Pall '688, the disclosure is directed toward providing a corrugated filter element that is resistant to corrugation collapse. (See column 2, lines 42-44). Pall '688 discloses many combinations of materials that cannot be steam sterilized without compromising the water wettability of the joints between the filter medium and the end caps. Accordingly, Ohtani, Meyering, and Pall '688, even when combined with Pall '483, fail to disclose or suggest a filter assembly comprising a plastic housing, the interior of which can be steam sterilized while the exterior is at atmospheric pressure, and a water-wettable filter medium embedded in end caps with water-wettable joints.

The inventive solution provided by claim 1 is not presented in these references, nor in their combination. The only way to make the combination presented by the present invention is in hindsight based on the Applicants' disclosure. Therefore, claim 1 is nonobvious in view of Pall '483 in view of Ohtani or Meyering et al. or Pall '688. Further, claims 2-34, which are directly or ultimately dependent upon claim 1, are also nonobvious in view of Pall '483 in view of Ohtani or Meyering et al. or Pall '688.

Discussion of Obviousness Rejection over Pall '483 in view of Ohtani or Meyering et al. or Pall '688 and further in view of Wagner

Dependent claims 35-42 are rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Pall '483 in view of Ohtani or Meyering et al. or Pall '688 and further in view of Wagner. This rejection is respectfully traversed.

With respect to the rejection over Pall '483 in view of Ohtani or Meyering et al. or Pall '688, the Applicants submit that in view of the arguments set out above, the rejected claims are nonobvious in view of these references.

With respect to Wagner, Wagner discloses a faucet spout which may be readily repaired. (See column 1, line 11). Nothing in Wagner even remotely relates to these problems (e.g., steam sterilization) and the inventive solution of the present invention. Accordingly, Wagner, even when combined with the other references, fails to render dependent claims 35-42 unpatentable.

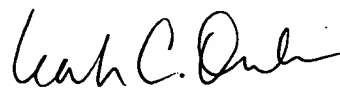
The solution provided by the present invention is not presented in these references, nor in their combination. The only way to make the combination presented by the present invention is in hindsight based on the Applicants' disclosure. Therefore, claim 1 is nonobvious in view of Pall '483 in view of Ohtani or Meyering et al. or Pall '688 and further in view of Wagner. Further, the dependent claims, including claims 35-42, all of which are directly or ultimately dependent upon claim 1, are also nonobvious in view of Pall '483 in view of Ohtani or Meyering et al. or Pall '688 and further in view of Wagner.

Conclusion

The application is considered in good and proper form for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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PATENT  
Attorney Docket No. 440191/PALL

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

GUTMAN et al.

Application No. 09/462,765

Art Unit: 1723

Examiner: M. Savage

Filed: June 2, 2000

For: FILTER ASSEMBLY

**AMENDMENTS TO SPECIFICATION, CLAIMS, AND ABSTRACT  
MADE IN RESPONSE TO OFFICE ACTION DATED FEBRUARY 22, 2001**

*Amendments to the paragraph beginning at page 11, line 4:*

The material of the first end cap 35 is chosen so that, when the filter medium 34 is connected to the first end cap 35, the characteristics of the medium 34 are not materially changed. In particular, when the filter medium 34 is of a water-wettable material, the material of the first end cap is chosen ~~to~~, so that a water wettable joint is formed between the filter medium 34 and the first end cap 35. In this case, the end cap material will depend on the material of the filter medium 34. For example, when the filter medium 34 is a FLUORODYNE or SUPOR medium, the end cap 35 may be composed of polypropylene. When the filter medium 34 is composed of a nylon material the first end cap 35 may be composed of a polyester or nylon material. When the filter medium is composed principally of PVDF which has been modified to make the medium water-wettable, the first and second end caps are preferably composed of polypropylene. When the filter medium is composed principally of polysulphone which has been modified to make the medium water-wettable, the first and second end caps are preferably composed of polypropylene.

*Amendments to existing claims:*

1. (Amended) A filter assembly comprising a plastics housing ~~(10)~~ providing an inlet port ~~(16)~~ and an outlet port ~~(31)~~, the material of the housing ~~(10)~~ being such that the assembly can be sterilized by subjecting the interior of the housing ~~(10)~~ to steam under pressure while the exterior of the housing ~~(10)~~ is at atmospheric pressure without damaging the housing, a

filter element ~~(11)~~ held in the housing ~~(10)~~ and comprising a filter medium ~~(34)~~ of water wettable material having a central passage extending between first and second ends of the filter medium ~~(34)~~, the first end of the filter medium being embedded in a first end cap ~~(35)~~ of a plastics material to close said passage and the second end of the filter medium being embedded in a second end cap ~~(36)~~ of a plastics material, said second end cap ~~(36)~~ providing a fluid connection between said passage and one of said ports ~~(16,31)~~, the first and second end caps ~~(35,36)~~ forming respective water-wettable joints with the filter medium ~~(34)~~.

2. (Amended) A filter assembly according to claim 1, wherein said embedding involves heating the end caps ~~(35,36)~~ to soften the end caps and inserting each one of said first and second ends into the associated end cap ~~(35,36)~~ while the associated end cap ~~(35,36)~~ is softened.

3. (Amended) A filter assembly according to claim 2, wherein said first and second end cap plastics material is such that the characteristics of the filter medium ~~(34)~~ adjacent to the end caps are not altered by said embedding.

4. (Twice Amended) A filter assembly according to claim 1, wherein the filter medium ~~(34)~~ is composed principally of PVDF which has been modified to make the medium water-wettable, and the first and second end caps ~~(35,36)~~ are composed of polypropylene.

5. (Twice Amended) A filter assembly according to claim 1, wherein the filter medium ~~(34)~~ is composed principally of polysulphone which has been modified to make the medium water-wettable, and the first and second end caps ~~(35,36)~~ are composed of polypropylene.

6. (Twice Amended) A filter assembly according to claim 1, wherein the filter medium ~~(34)~~ is a FLUORODYNE or SUPOR medium and the first and second end caps ~~35,36~~ are composed of polypropylene.

7. (Twice Amended) A filter assembly according to claim 1, wherein the filter medium ~~(34)~~ is composed of a nylon material and the first and second end caps ~~(35,36)~~ are composed of a polyester or a nylon material.

8. (Twice Amended) A filter assembly according to claim 1 wherein the filter element ~~(34)~~ is integrity testable by the Diffusive Forward Flow Test or by the Water Bubble Point Test.

9. (Twice Amended) A filter assembly according to claim 2, wherein the plastics material of the first and second end caps ~~(35,36)~~ can be softened at a temperature which is sufficiently low such that the integrity of the filter medium ~~(34)~~ is undamaged when the filter medium ~~(35,36)~~ is inserted into the first and second end caps ~~(35,36)~~ when the first and second end caps ~~(35,36)~~ are at said temperature.

13. (Twice Amended) A filter assembly according to claim 1, wherein the housing ~~(10)~~ resists exposure of the interior of the housing ~~(10)~~ to steam at about 121°C and about 1 bar above atmospheric pressure while the exterior of the housing ~~(10)~~ is exposed to atmospheric pressure.

14. (Twice Amended) A filter assembly according to claim 1, wherein plastics material of the housing ~~(10)~~ is one of polysulphone, PEEK, PEK, polyphenyleneoxide, polyphenylenesulphide, polyethersulphone, polyalkoxysulphone or polyarylsulphone.

15. (Twice Amended) A filter assembly according to claim 1, wherein said filter medium ~~(34)~~ is generally annular, the first end cap ~~(35)~~ being generally disc-shaped and the second end cap ~~(36)~~ being generally annular with a central aperture for connection to one of said ports ~~(16,31)~~ of the housing.

16. (Amended) A filter assembly according to claim 15, wherein the filter medium ~~(34)~~ is pleated.

17. (Twice Amended) A filter assembly according to claim 15, wherein the second end cap ~~(31)~~ includes a projection ~~(39)~~ defining a fluid path, said projection ~~(39)~~ being received in the associated port ~~(16,31)~~ to provide fluid communication therebetween.

18. (Amended) A filter assembly according to claim 17, wherein said housing ~~(10)~~ includes first and second opposed end walls ~~(15,28)~~, said housing port ~~(31)~~ in fluid communication with the second end cap ~~(31)~~ being formed in said second end wall ~~(28)~~, the filter element extending from said second end wall ~~(28)~~ towards said first end wall ~~(15)~~.



19. (Amended) A filter assembly according to claim 18, wherein the housing ~~(10)~~ has a side wall ~~(17)~~ of generally circular cross-section extending between said first and second end walls ~~(15, 28)~~.

20. (Twice Amended) A filter assembly according to claim 1, wherein the housing ~~(10)~~ is formed by first and second housing parts ~~(13, 14)~~ connected together.

21. (Twice Amended) A filter assembly according to claim 19, wherein the housing is formed by first and second housing parts connected together and wherein the first housing part ~~(13, 14)~~ includes said first end wall ~~(15)~~ and said side wall ~~(17)~~ and the second housing part ~~(14)~~ includes said second end wall ~~(28)~~.

22. (Twice Amended) A filter assembly according to claim 20, wherein the first housing part ~~(13)~~ and the second housing part ~~(14)~~ co-operate to clamp the filter element ~~(11)~~ between said housing parts ~~(13, 14)~~ to hold the filter element in the housing.

23. (Amended) A filter element according to claim 22, wherein the filter element ~~(11)~~ includes first and second oppositely facing clamping surfaces, the first housing part ~~(13)~~ bearing against the first clamping surface and the second housing part ~~(14)~~ bearing against the second clamping surface.

24. (Amended) A filter element according to claim 23, wherein said first and second clamping surfaces are formed on said second end cap ~~(31)~~.

25. (Amended) A filter element according to claim 24, wherein the first clamping surface is formed on at least one flange ~~(42)~~ projecting from said second end cap ~~(31)~~.

26. (Twice Amended) A filter assembly according to claim 18, wherein the housing is formed by first and second housing parts connected together, wherein the first housing part and the second housing part cooperated to clamp the filter element between said housing parts to hold the filter element in the housing, wherein the filter element includes first and second oppositely facing clamping surfaces, the first housing part bearing against the first clamping surface and the second housing part bearing against the second clamping surface, wherein said first and second clamping surfaces are formed on said second end cap, and wherein said second clamping surface is formed on a portion of said second end cap ~~(31)~~ extending around said projection ~~(34)~~.

27. (Twice Amended) A filter assembly according to claim 25 wherein said first housing part ~~(13)~~ has a peripheral edge ~~(18)~~ remote from said first end wall ~~(15)~~, said peripheral edge ~~(18)~~ bearing against said at least one flange ~~(42)~~ to force the second clamping surface against a portion of the second end wall ~~(28)~~ of the housing ~~(10)~~ around the associated port ~~(31)~~.

28. (Twice Amended) A filter assembly according to claim 1, wherein the filter medium ~~(34)~~ is annular and has a curved exterior surface surrounded by a cage ~~(37)~~.

29. (Amended) A filter assembly according to claim 28 wherein the cage ~~(37)~~ is formed from the same material as the end caps ~~(35,36)~~.

30. (Twice Amended) A filter assembly according to claim 1, wherein the housing ~~(10)~~ is provided with at least one valve ~~(12)~~ that is manually operable to open and close the valve, the valve when open providing a fluid flow path between the exterior and the interior of the housing ~~(10)~~.

31. (Amended) A filter assembly according to claim 30, wherein the or each said valve ~~(12)~~ is formed from materials that can be steam autoclaved.

32. (Amended) A filter assembly according to claim 31, wherein the or each valve ~~(12)~~ is such that the assembly can be sterilized by subjecting the interior of the housing ~~(10)~~ to steam under pressure while the exterior of the housing ~~(10)~~ is at atmospheric pressure without damaging the valve ~~(12)~~.

33. (Amended) A filter assembly according to claim 30, wherein the or each valve ~~(12)~~ is resistant to exposure of the interior of the housing to steam at about 121°C and about 1 bar above atmospheric pressure while the exterior of the housing is exposed to atmospheric pressure.

34. (Twice Amended) A filter assembly according to claim 30, wherein the or each said valve ~~(12)~~ is formed principally from one of polysulphone, PEEK, PEK, polyphenyleneoxide, polyphenylenesulphide, polyethersulphone, polyalkoxysulphone or polyarylsulphone.

35. (Twice Amended) A filter assembly according to claim 30, wherein the or each valve ~~(12)~~ includes an annular sleeve ~~(49)~~ surrounding a passage ~~(48)~~ generally circular in cross-section, movement of said annular sleeve ~~(49)~~ in one sense opening said valve and movement of the annular sleeve ~~(49)~~ in a sense opposite said one sense closing said valve ~~(12)~~.

36. (Amended) A filter assembly according to claim 35, wherein the or each passage ~~(48)~~ contains a valve member ~~(43)~~, movement of the associated sleeve ~~(49)~~ causing said valve member ~~(43)~~ to move between a first position in which said valve member ~~(43)~~ permits flow through said passage ~~(48)~~ and a second position in which said valve member ~~(43)~~ prevents flow through said passage ~~(48)~~.

37. (Amended) A filter assembly according to claim 36, wherein the or each valve member ~~(43)~~ moves axially relative to the associated passage ~~(48)~~ between said first and second positions.

38. (Amended) A filter assembly according to claim 37, wherein the sleeve ~~(49)~~ and the valve member ~~(43)~~ of the or each valve ~~(12)~~ are connected together, the sleeve ~~(49)~~ surrounding said associated passage ~~(46)~~ and the valve member ~~(43)~~ extending into an end of said passage ~~(48)~~, said valve member ~~(43)~~ including a passage ~~(48)~~ which is in fluid communication with the associated passage ~~(46)~~ when the valve ~~(12)~~ is open and which is not in fluid communication when the valve ~~(12)~~ is closed.

39. (Twice Amended) A filter assembly according to claim 35, wherein, for the or each valve ~~(12)~~, a mechanism acts between the sleeve ~~(49)~~ and the housing ~~(10)~~ such that rotation of the sleeve ~~(49)~~ results in axial movement of said valve member ~~(43)~~ between said first and second positions.

40. (Amended) A filter assembly according to claim 39, wherein the or each mechanism limits the extent of the axial movement of the associated valve member ~~(43)~~.

41. (Twice Amended) A filter assembly according to claim 39 wherein the or each mechanism comprises a pin ~~(27)~~ and a cooperating slot ~~(51)~~.

In re Appln. of Gutman et al.  
Application No. 09/462,765

42. (Amended) A filter assembly according to claim 41 wherein the or each pin ~~(27)~~ is carried on an exterior surface of the housing ~~(10)~~ and the associated slot ~~(51)~~ extends helically partially around the sleeve ~~(49)~~.



PATENT  
Attorney Docket No. 440191/PALL

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

GUTMAN et al.

Art Unit: 1723

Application No. 09/462,765

Examiner: M. Savage,

Filed: June 2, 2000

For: FILTER ASSEMBLY

**PENDING CLAIMS AFTER AMENDMENTS  
MADE IN RESPONSE TO OFFICE ACTION DATED FEBRUARY 22, 2001**

1. A filter assembly comprising a plastics housing providing an inlet port and an outlet port, the material of the housing being such that the assembly can be sterilized by subjecting the interior of the housing to steam under pressure while the exterior of the housing is at atmospheric pressure without damaging the housing, a filter element held in the housing and comprising a filter medium of water wettable material having a central passage extending between first and second ends of the filter medium, the first end of the filter medium being embedded in a first end cap of a plastics material to close said passage and the second end of the filter medium being embedded in a second end cap of a plastics material, said second end cap providing a fluid connection between said passage and one of said ports, the first and second end caps forming respective water-wettable joints with the filter medium.

2. A filter assembly according to claim 1, wherein said embedding involves heating the end caps to soften the end caps and inserting each one of said first and second ends into the associated end cap while the associated end cap is softened.

3. A filter assembly according to claim 2, wherein said first and second end cap plastics material is such that the characteristics of the filter medium adjacent to the end caps are not altered by said embedding.

4. A filter assembly according to claim 1, wherein the filter medium is composed principally of PVDF which has been modified to make the medium water-wettable, and the first and second end caps are composed of polypropylene.

5. A filter assembly according to claim 1, wherein the filter medium is composed principally of polysulphone which has been modified to make the medium water-wettable, and the first and second end caps are composed of polypropylene.

6. A filter assembly according to claim 1, wherein the filter medium is a FLUORODYNE or SUPOR medium and the first and second end caps are composed of polypropylene.

7. A filter assembly according to claim 1, wherein the filter medium is composed of a nylon material and the first and second end caps are composed of a polyester or a nylon material.

8. A filter assembly according to claim 1 wherein the filter element is integrity testable by the Diffusive Forward Flow Test or by the Water Bubble Point Test.

9. A filter assembly according to claim 2, wherein the plastics material of the first and second end caps can be softened at a temperature which is sufficiently low such that the integrity of the filter medium is undamaged when the filter medium is inserted into the first and second end caps when the first and second end caps are at said temperature.

13. A filter assembly according to claim 1, wherein the housing resists exposure of the interior of the housing to steam at about 121°C and about 1 bar above atmospheric pressure while the exterior of the housing is exposed to atmospheric pressure.

14. A filter assembly according to claim 1, wherein plastics material of the housing is one of polysulphone, PEEK, PEK, polyphenyleneoxide, polyphenylenesulphide, polyethersulphone, polyalkoxysulphone or polyarylsulphone.

15. A filter assembly according to claim 1, wherein said filter medium is generally annular, the first end cap being generally disc-shaped and the second end cap being generally annular with a central aperture for connection to one of said ports of the housing.

16. A filter assembly according to claim 15, wherein the filter medium is pleated.

17. A filter assembly according to claim 15, wherein the second end cap includes a projection defining a fluid path, said projection being received in the associated port to provide fluid communication therebetween.

18. A filter assembly according to claim 17, wherein said housing includes first and second opposed end walls, said housing port in fluid communication with the second end cap being formed in said second end wall, the filter element extending from said second end wall towards said first end wall.

19. A filter assembly according to claim 18, wherein the housing has a side wall of generally circular cross-section extending between said first and second end walls.

20. A filter assembly according to claim 1, wherein the housing is formed by first and second housing parts connected together.

21. A filter assembly according to claim 19, wherein the housing is formed by first and second housing parts connected together and wherein the first housing part includes said first end wall and said side wall and the second housing part includes said second end wall.

22. A filter assembly according to claim 20, wherein the first housing part and the second housing part co-operate to clamp the filter element between said housing parts to hold the filter element in the housing.

23. A filter element according to claim 22, wherein the filter element includes first and second oppositely facing clamping surfaces, the first housing part bearing against the first clamping surface and the second housing part bearing against the second clamping surface.

24. A filter element according to claim 23, wherein said first and second clamping surfaces are formed on said second end cap.

25. A filter element according to claim 24, wherein the first clamping surface is formed on at least one flange projecting from said second end cap.

26. A filter assembly according to claim 18, wherein the housing is formed by first and second housing parts connected together, wherein the first housing part and the second housing part cooperated to clamp the filter element between said housing parts to hold the

filter element in the housing, wherein the filter element includes first and second oppositely facing clamping surfaces, the first housing part bearing against the first clamping surface and the second housing part bearing against the second clamping surface, wherein said first and second clamping surfaces are formed on said second end cap, and wherein said second clamping surface is formed on a portion of said second end cap extending around said projection.

27. A filter assembly according to claim 25 wherein said first housing part has a peripheral edge remote from said first end wall, said peripheral edge bearing against said at least one flange to force the second clamping surface against a portion of the second end wall of the housing around the associated port.

28. A filter assembly according to claim 1, wherein the filter medium is annular and has a curved exterior surface surrounded by a cage.

29. A filter assembly according to claim 28 wherein the cage is formed from the same material as the end caps.

30. A filter assembly according to claim 1, wherein the housing is provided with at least one valve that is manually operable to open and close the valve, the valve when open providing a fluid flow path between the exterior and the interior of the housing.

31. A filter assembly according to claim 30, wherein the or each said valve is formed from materials that can be steam autoclaved.

32. A filter assembly according to claim 31, wherein the or each valve is such that the assembly can be sterilized by subjecting the interior of the housing to steam under pressure while the exterior of the housing is at atmospheric pressure without damaging the valve.

33. A filter assembly according to claim 30, wherein the or each valve is resistant to exposure of the interior of the housing to steam at about 121°C and about 1 bar above atmospheric pressure while the exterior of the housing is exposed to atmospheric pressure.

34. A filter assembly according to claim 30, wherein the or each said valve is formed principally from one of polysulphone, PEEK, PEK, polyphenyleneoxide, polyphenylenesulphide, polyethersulphone, polyalkoxysulphone or polyarylsulphone.



35. A filter assembly according to claim 30, wherein the or each valve includes an annular sleeve surrounding a passage generally circular in cross-section, movement of said annular sleeve in one sense opening said valve and movement of the annular sleeve in a sense opposite said one sense closing said valve.

36. A filter assembly according to claim 35, wherein the or each passage contains a valve member, movement of the associated sleeve causing said valve member to move between a first position in which said valve member permits flow through said passage and a second position in which said valve member prevents flow through said passage.

37. A filter assembly according to claim 36, wherein the or each valve member moves axially relative to the associated passage between said first and second positions.

38. A filter assembly according to claim 37, wherein the sleeve and the valve member of the or each valve are connected together, the sleeve surrounding said associated passage and the valve member extending into an end of said passage, said valve member including a passage which is in fluid communication with the associated passage when the valve is open and which is not in fluid communication when the valve is closed.

39. A filter assembly according to claim 35, wherein, for the or each valve, a mechanism acts between the sleeve and the housing such that rotation of the sleeve results in axial movement of said valve member between said first and second positions.

40. A filter assembly according to claim 39, wherein the or each mechanism limits the extent of the axial movement of the associated valve member.

41. A filter assembly according to claim 39 wherein the or each mechanism comprises a pin and a cooperating slot.

42. A filter assembly according to claim 41 wherein the or each pin is carried on an exterior surface of the housing and the associated slot extends helically partially around the sleeve.

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66. A filter assembly according to claim 1, wherein the housing resists exposure of the interior of the housing to steam at about 142°C and at about 2.83 bars above atmospheric pressure while the exterior of the housing is exposed to atmospheric pressure.

67. A filter assembly according to claim 30, wherein the or each valve is resistant to exposure of the interior of the housing to steam at about 142°C and about 2.83 bars above atmospheric pressure while the exterior of the housing is exposed to atmospheric pressure.